**Ceftazidime***

**Class: β-lactam**

Overview

Ceftazidime is a third generation parenterally administered cephalosporin that is usually well tolerated by the patient. As stated in the general overview of cephalosporins, third generation cephalosporins possess only moderate activity against Gram-positive bactera, but are more active against several Gram-negative bacteria, especially the enterobacteriaciae. When compared with second generation cephalosporins, the third generation cephalosporins, however, exhibit reduced activity against staphylococci. Ceftazidime is resistant to staphylococcal β-lactamase but is inactive against these organisms due to reduced binding to enzymes that function in staphylococcal cell wall synthesis. Ceftazidime is the only third generation cephalosporin with activity against sensitive strains of *P aerugionsa* and is referred to as an anti-peudomonal β-lactam agent.

Resistance

Excessive use of β-lactams, especially cephalosporins, has created emergence of methicillin resistant *Staphylococcus aureus* (MRSA) and resistance by Gram-negative organisms to third generation cephalosporins, of which resistance to ceftazidime is the most frequently recognized. This mechanism of this resistance is the production of β-lactamases. β-lactamases that are capable of conferring resistance to third generation cephalosporins include extended spectrum β-lactamases (ESBLs) that are plasmid encoded and other chromasomally encoded enzymes. Most of these ESBLs are mutants of long-prevalent plasmid mediated penicillinases. Evidence of ESBLs is illustrated in observations that half to two thirds of ceftazidime-resistant *Klebsiella* strains are also resistant to gentamicin, tobramycin and ciprofloxacin. ESBLs are primarily implicated in nosocomial infections and exposure to ceftazidime has been associated with increased prevalence of ESBL producing organisms. Often in-vitro tests indicate susceptibility inaccurately, therefore if ESBLs are detected in an organism, all penicillins, cephalopsorins and aztreonam - a monobactam, should be considered resistant. Ceftazidime is also ineffective against enterococci and evidence of in-vitro sensitivity should be discounted.

Effectiveness

Ceftazidime, like other third generation cephalosporins is utilized primarily for its activity against Gram-negative aerobic organisms. As stated before, ceftazidime is the only third generation cephalosporin that is generally effective against *P. aeruginosa* and is commonly utilized against infections caused by this etiology, such as osteomyelitis. The drug exhibits only moderate activity against Gram-positive bacteria, however Group

B streptococci are uniformly susceptible. Although inferior in activity against staphylococci the drug is often recommended for therapy of methicillin sensitive *Staphylococcus aureus* (MSSA). The third generation cephalosporins are usually highly resistant to β-lactamases. Third generation cephalosporins can be effective therapeutic agents against bacterial meningitis caused by susceptible pathogens, due to the ability to cross the blood-brain barrier.

***References available by request. Call the Infectious Disease Epidemiology Section, Office of Public Health, Louisiana Department of Health and Hospitals (504-219-4563)**